

Combining a desire to help patients with an interest in state-of-the-art technology, these healthcare workers provide a vital service for diagnosing and treating medical conditions.

by Alan Lacey

Jill finishes preparing Roger for the procedure, attaching EKG patches on his chest and rubbing a cold gel on the area above his heart. She places an instrument called a transducer, which takes a kind of sonic photograph of the heart, over his chest. For the next 45 minutes, she uses sophisticated equipment to take many different readings. These images are meaningful to Jill's trained eye, and part of her job is to explain their function to Roger. Following the exam, she provides the results to his physician.

Diagnostic medical sonographers, like the one described in the example above, use special equipment to direct high-frequency sound waves into areas of a patient's body. Sonographers operate the equipment, which collects reflected echoes and forms an image that may be videotaped, transmitted, or photographed for interpretation and diagnosis by a physician. Many people associate sonography,

or ultrasonography, with obstetrics and the viewing of the fetus in the womb. But this technology has many other applications in the diagnosis and treatment of medical conditions.

Keep reading to learn more about diagnostic medical sonographers. You'll learn what they do, including their various specialties within the occupation; what their working conditions, employment and outlook, and earnings are; and what qualifications and training they need to pursue a career. To continue your research, see the sources of additional information at the end.

#### Nature of the work

Sonographers begin an examination session by explaining the procedure to the patient and recording his or her medical history relevant to the condition being viewed. To perform the exam, sonographers use a transducer, which transmits

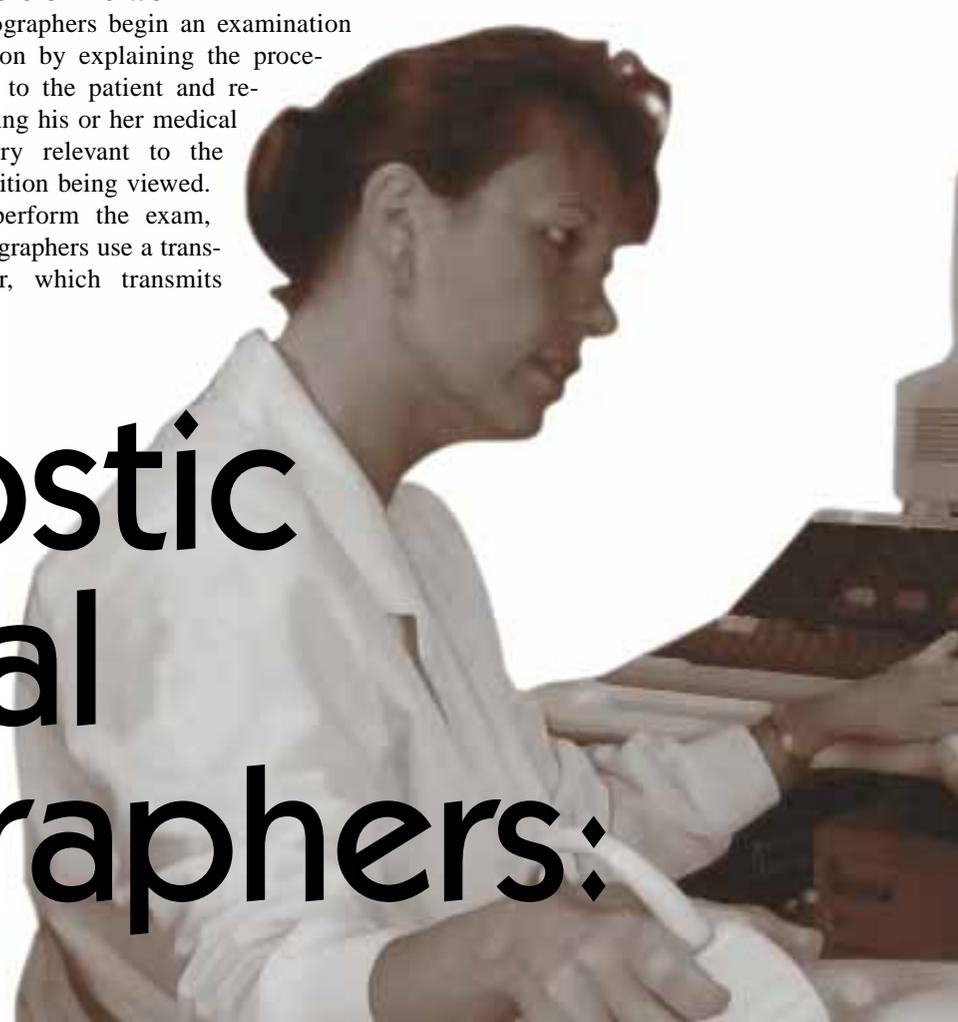
sound waves in a cone- or rectangle-shaped beam. They select appropriate equipment settings and direct the patient to move into positions that will provide the best view. Although techniques may vary based on the area being examined, sonographers usually spread a special gel on the skin to aid the transmission of sound waves.

Then, the sonographer moves the transducer over the patient's skin; the reflected sound wave echoes are collected by the ultrasound equipment, generating a digital image that is displayed on a screen nearby. Viewing the screen during the scan, sonographers look for subtle visual cues

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Alan Lacey is an economist in the Office of Employment Projections, BLS, (202) 691-5731.

# Diagnostic medical sonographers:



that contrast healthy areas from unhealthy ones. They decide whether the images are acceptable for diagnostic purposes and select which ones to show to the physician.

Diagnostic medical sonographers usually specialize in 1 of 6 areas: abdominal sonography, cardiac sonography, neurosonography, obstetric and gynecologic sonography, ophthalmologic sonography, and vascular technology.

**Abdominal sonography.** Sonographers specializing in abdominal sonography inspect a patient's abdominal cavity to help diagnose and treat conditions involving the gallbladder, bile ducts, kidneys, liver,

pancreas, and spleen. Abdominal sonographers also may scan the thorax, muscles, breast, and other areas.

**Cardiac sonography.** Cardiac sonographers produce images of the heart and nearby blood vessels for diagnosis and treatment of heart ailments. Cardiac sonographers use several types of ultrasound techniques, including traditional ultrasound, Doppler, and duplex ultrasound, to produce an image or video of blood flowing through heart chambers.

**Neurosonography.** Neurosonography uses ultrasound technology to focus on the nervous system, including the brain. In neonatal care, neurosonographers study and diagnose neurological and nervous system disorders in premature infants; for example, accurate sonographer-identified images of small bleeds in brain tissue and blood vessels can increase an infant's chance of a better outcome.

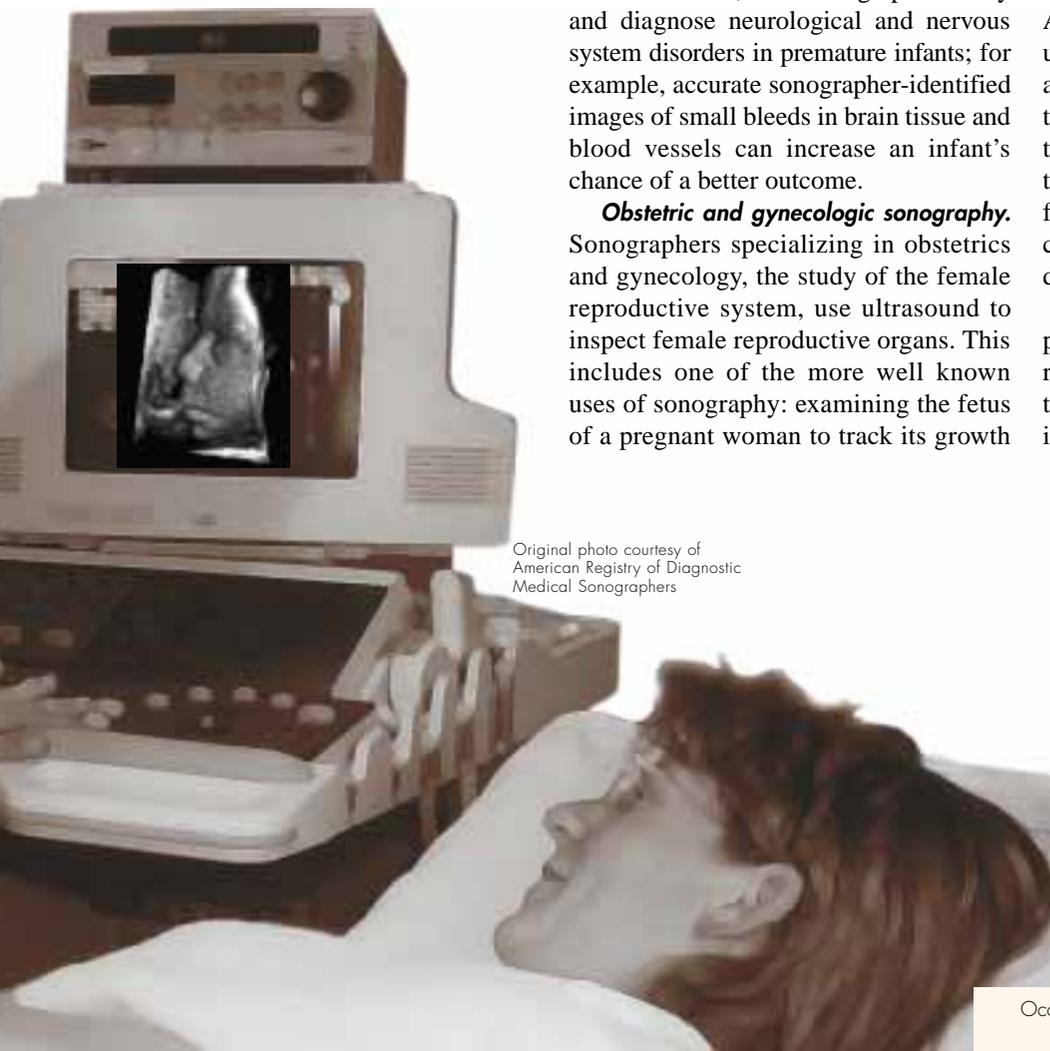
**Obstetric and gynecologic sonography.** Sonographers specializing in obstetrics and gynecology, the study of the female reproductive system, use ultrasound to inspect female reproductive organs. This includes one of the more well known uses of sonography: examining the fetus of a pregnant woman to track its growth

and health.

**Ophthalmologic sonography.** In ophthalmology, the study of the eye, ultrasound aids in the insertion of prosthetic lenses by allowing accurate measurement of the eye. Ophthalmologic sonography also helps to diagnose and track tumors, blood supply conditions, separated retinas, and other ailments of the eye and surrounding tissue. Ophthalmologic sonographers use high-frequency transducers made exclusively for the eye that are smaller than those used in other specialties.

**Vascular technology.** A vascular technologist uses ultrasound to create diagnostic images of the circulatory system. Although they typically obtain results for use in diagnosis, vascular technologists also examine blood vessels after surgery to make sure a reconstructed vein or artery is functioning correctly. Vascular technologists examine and record the flow of blood in all parts of the body except the heart, which is the domain of cardiac sonographers.

In addition to working directly with patients, diagnostic medical sonographers have other duties. They keep patient records, perform quality control testing, and adjust and maintain equipment.



Original photo courtesy of American Registry of Diagnostic Medical Sonographers

# Seeing with sound

They may also prepare work schedules, evaluate equipment purchases, and manage a sonography or diagnostic imaging department.

### **Working conditions**

Most full-time sonographers work about 40 hours a week, which may include evening or weekend hours and times during which they are on call and must be ready to report to work on short notice.

Sonographers typically work indoors in healthcare facilities that are clean and well lit. Some travel to patients' homes in large vans equipped with sophisticated diagnostic equipment. Sonographers should

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**Sonographers use ultrasound equipment suited to their occupational focus in 1 of 6 specialties.**

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be physically fit because they are on their feet for long periods and may have to lift or turn disabled patients. They work in special ultrasound rooms or at patients' bedsides.

### **Employment and outlook**

According to Bureau of Labor Statistics (BLS) data, diagnostic medical sonographers held about 29,300 jobs in 1999. That number excludes cardiac sonographers and vascular technologists, who were counted differently. More than half of all sonographer jobs are in hospitals. Most of the rest are in physicians' offices and clinics, primarily in offices specializing in obstetrics and in diagnostic imaging centers. According to a 2000 survey conducted by the Society of Diagnostic Medical Sonography, about three-fourths of all sonographers worked in urban areas.

Employment of diagnostic medical sonographers is expected to increase through 2008 as the population grows and ages, increasing the demand for diagnostic imaging and therapeutic technology. Some job openings also will arise from the need to replace sonographers who leave the occupation.

Ultrasound is becoming an increasingly popular alternative to radiologic procedures as patients seek safer treatment methods. Unlike most diagnostic

imaging methods, ultrasound does not involve radiation; therefore, harmful side effects and complications from repeated use are rarer for both the patient and the sonographer. Sonographic technology is expected to evolve rapidly and spawn many new ultrasound procedures, such as 3D-ultrasonography for use in obstetric and ophthalmologic diagnosis. However, high costs may limit the rate at which some promising new technologies are adopted.



Original photo courtesy of ATL Ultrasound

Hospitals will remain the principal employer of diagnostic medical sonographers. However, employment is expected to grow most rapidly in offices and clinics of physicians, including diagnostic imaging centers. Health facilities such as these are expected to grow very rapidly

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**Employment of sonographers is expected to increase with ultrasound's popularity as a safer alternative to radiologic procedures.**

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through 2008 because of a strong shift toward outpatient care, encouraged by third-party payers and made possible by technological advances that permit more procedures to be performed outside the hospital.

### **Earnings**

BLS data show median annual earnings of diagnostic medical sonographers were \$42,330 in 1999. The middle 50 percent earned between \$36,780 and \$50,230 a year. The lowest 10 percent earned less than \$31,190, and the highest 10 percent earned more than \$56,030.

According to the 2000 survey by the Society of Diagnostic Medical Sonography, almost 60 percent of all sonographers earned between \$30,000 and \$50,000 annually. About 1 in 5 earned \$50,000 to \$65,000, and fewer than 1 in 10 earned more than \$65,000. The remainder earned less than \$30,000 annually.

### **Qualifications and training**

Sonographers need good communication and interpersonal skills because they must be able to explain technical procedures and

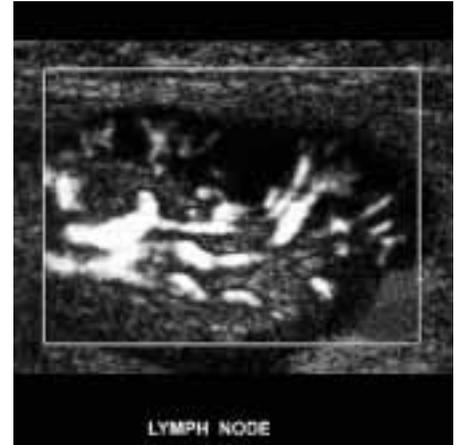
results to their patients, some of whom may be nervous about the exam or the problems it may reveal. They also should have some background in math and science, especially when they must perform mathematical and scientific calculations in analyses for diagnosis.

But sonographers also need qualities not learned in textbooks. "Sonographers share a common bond of enjoying working with people and contributing to the treatment and recovery of patients in their care," says Stephen McLaughlin, president of the Society of Diagnostic Medical Sonography. Most sonographers combine this desire to help people with an interest in state-of-the-art technology and techniques.

There are several ways to enter the occupation. Sonographers may train in hospitals, vocational-technical institutions, colleges and universities, and the Armed Forces. Most training programs prefer that applicants have a background in science or experience in other health professions, although some will consider college graduates who have a background in liberal arts or high school graduates who have completed coursework in math and science.

Colleges and universities offer formal training in both 2- and 4-year programs, culminating in an associate or bachelor's degree. Two-year programs are most prevalent. Coursework includes classes in anatomy, physiology, instrumentation, physics, patient care, and medical ethics. The Joint Review Committee on Education for Diagnostic Medical Sonography accredits most formal training programs, which numbered 76 in 1999.

Some health workers, including obstetric nurses and radiologic technologists, increase their marketability by cross training in fields such as sonography. Many complete 1-year certificate programs. Additionally, sonographers specializing in one discipline often seek



competency in others; for example, obstetric sonographers might train in abdominal sonography to broaden their opportunities.

No State requires licensure in diagnostic medical sonography. However, the American Registry of Diagnostic Medical Sonographers certifies the competency of sonographers through examination and registration, an independent measure of an individual's professional standing. Many employers prefer to hire sonographers who have met these certification standards, which include passing examinations in both general physics and instrumentation and in a specialty such as neurosonography.

Although formal education is not required to take the exams, an associate or bachelor's degree from an accredited program is preferred. Beginning in 2005, the Registry will consider for registration only those holding an associate or higher degree. To keep their registration current, sonographers must complete 30 hours of continuing education every 3 years to stay abreast of advances in the occupation and its technology.

### **Sources of additional information**

To learn more about diagnostic medical sonography, visit your local library for books and periodicals on the subject.

Most libraries and career counseling offices also have copies of the 2000-01 edition of the *Occupational Outlook Handbook*, which describes about 250 occupations. Among the occupations covered are some that, like diagnostic medical sonographer, involve workers who help health practitioners diagnose and treat patients. These occupations include radiologic technologist and technician, nuclear medicine technologist, and cardiovascular technologist.

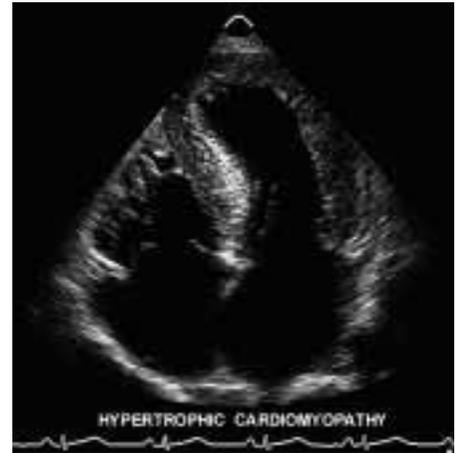
The *Handbook* also is available online,

<http://stats.bls.gov/ocohome.htm>.

For more information about a career as a diagnostic medical sonographer, contact:

Society of Diagnostic Medical  
Sonography  
12770 Coit Rd., Suite 708  
Dallas, TX 75251  
1 (800) 229-9506  
<http://www.sdms.org>

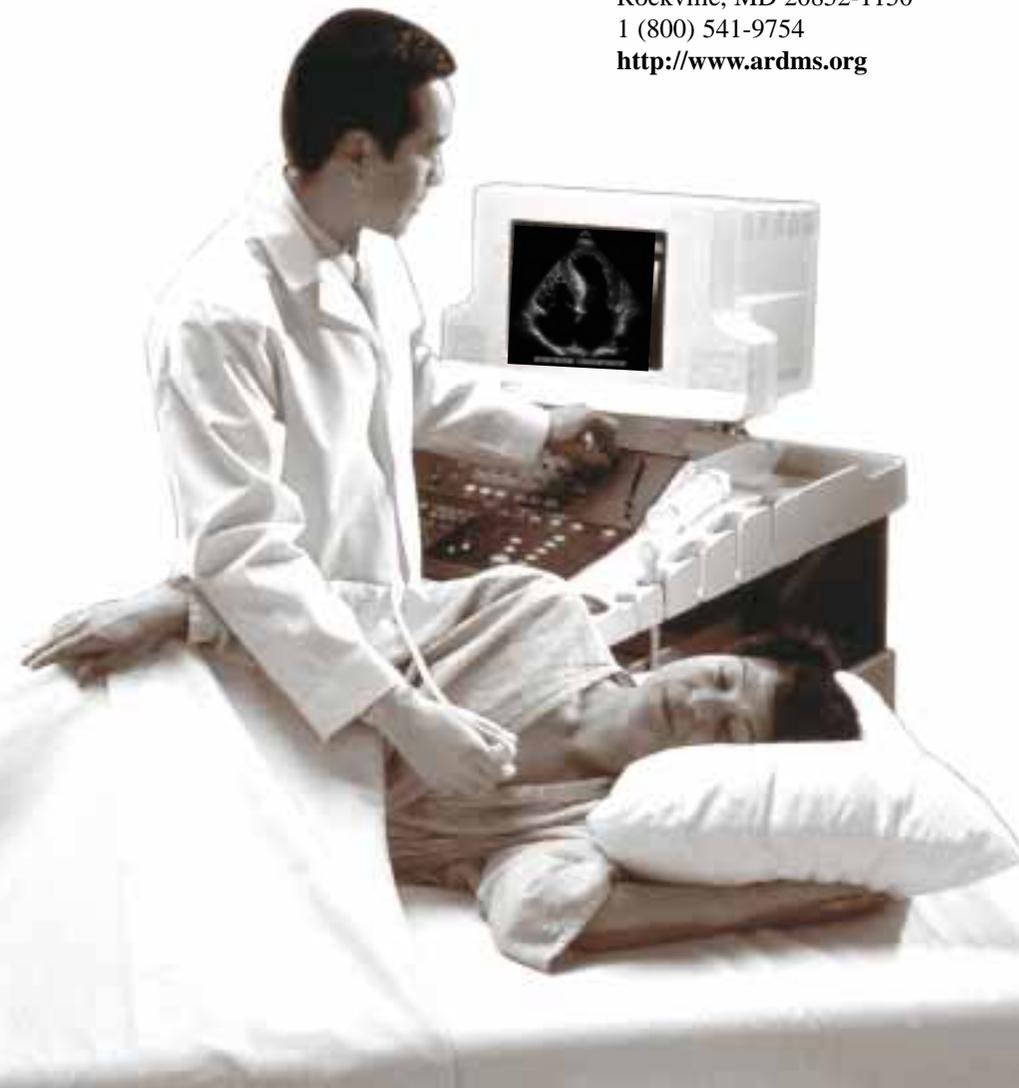
The American Registry of Diagnostic  
Medical Sonographers  
600 Jefferson Plaza, Suite 360  
Rockville, MD 20852-1150  
1 (800) 541-9754  
<http://www.ardms.org>



All clinical images courtesy of ATL Ultrasound

For a current list of accredited education programs in diagnostic medical sonography, contact the Commission on Accreditation of Allied Health Education at (312) 553-9355 or via:

Joint Review Committee on Education  
in Diagnostic Medical Sonography  
1248 Harwood Rd.  
Bedford, TX 76021-4244  
<http://www.caahep.org/programs/programs.htm> 



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